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To: DWSE Staff

Through: Robert W. Hicks, Director,  
Office of Environmental Health Services

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Division of Water Supply Engineering

From: M/DBP Team

Subject: Water – Procedure – Sample Collection and Analysis – D/DBP Testing Requirements

This working memo addresses disinfection byproducts, disinfection byproduct precursors, and disinfection residual monitoring, compliance, reporting and recordkeeping requirements for waterworks serving a population of 10,000 people or more using surface water or groundwater under the direct influence of surface water. These requirements begin January 1, 2002. If the revisions to the *Waterworks Regulations* are not published before July 2003, a separate working memorandum will be developed to address the requirements for the remaining waterworks before their compliance date of January 1, 2004.

## MONITORING REQUIREMENTS

### 1. MONITORING PLANS

All ~~systems~~ waterworks (including wholesalers) meeting the above criteria must develop and implement a plan for disinfection byproducts, byproduct precursors, and residual monitoring. The plan must be submitted to the State for review and approval no later than the date of the first required report and must be made available for inspection by the State and public. The plan submittal dates are as follows:

Submittal Date	Available Date	Parameter	
2/10/02	1/31/02	Disinfection Residuals	Chlorine, Chloramines and Chlorine dioxide
2/10/02	1/31/02	Disinfection Precursors	TOC and Alkalinity
4/10/02	1/31/02	Disinfection Byproducts	TTHMs and HAA5s, Chlorite, Bromate

Each plan must include the following:

- Specific locations and schedules for collecting samples
- How the system will calculate compliance with PMCLs, MRDLs and Treatment Techniques.

The DBPR Implementation Guidance Manual (Manual) states while there is no special primacy condition related to monitoring plans, EPA suggests that the states consider developing a procedure for waterworks to follow when preparing the required monitoring plans. The key item in developing the monitoring plan is to use a format that is useful to both the state and the waterworks. The Manual suggests the following information be included in the monitoring plan:

- ❖ A cover page that identifies the waterworks and includes relevant information such as:
  - Waterworks name
  - PWSID Number
  - Address
  - Contact Person and phone number
  - System type (Community, nontransient noncommunity or transient noncommunity)
  - Population served

- Source water information (number and type)
- Entry points (tied to sources)
- Treatment provided (tied to sources and entry points)
- ❖ A summary of the monitoring that will be required of the waterworks, including monitoring for:
  - Disinfection byproducts
  - Disinfectants
  - Disinfection byproduct precursors
- ❖ Schematic drawing of all treatment facilities, including:
  - Sources
  - Identification of treatment type and purpose
  - Identification of chemicals applied and points of application
  - Each unit process of each treatment train (with flow rates)
  - Sampling points identified and numbered (e.g. T-1, T-2)
- ❖ A schematic drawing of the distribution system, including:
  - Sources
  - Entry points
  - Treatment facilities
  - Storage facilities
  - Sampling points identified and numbered (e.g. D-1, D-2)
- ❖ A summary of typical waterworks operating characteristics (on a seasonal basis if necessary) explaining how sources are used to meet system demands, where extended residence times are expected to occur, etc.
- ❖ A schedule for collecting all required samples including frequency and time for collection<sup>1</sup>, sample site identification number, sample handling/preservation requirements and analysis plan for each sample (on site analysis, certified laboratory). The schedule should address both regular monitoring and reduced monitoring frequencies.
- ❖ The plan should also distinguish between compliance samples and those taken for process control and/or information.
- ❖ For conventional treatment plants using surface water or groundwater under the direct influence of surface water, a summary of the waterworks' enhanced coagulation/softening requirements.
- ❖ A plan for calculating compliance with MCLs, MRDLs and treatment techniques (unless compliance is calculated by the state based upon required monitoring reports).

The Manual also suggests that the waterworks may wish to incorporate other monitoring requirements such as the bacteriological sample-siting plan into one document.

Appendix A to this working memo is a sample monitoring plan form for your consideration. The Team understands that many waterworks and Field Offices have developed their own format and that no one format is applicable to all situations. The waterworks owners must understand that all samples listed in the monitoring plan are considered compliance samples. An operational sample may not be substituted for a compliance sample.

According to the Rule, failure to monitor in accordance with the monitoring plan is a monitoring violation.

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<sup>1</sup> If the waterworks has control of the laboratory testing then the time of collection must be listed by date(s) or day(s) of the week that sampling will be done. If the waterworks is not in control of the laboratory (i.e. DCLS) then the waterworks may use a range of dates such as "within 'x' number of days of receiving the sample containers."

## 2. MONITORING FREQUENCY

### Routine Monitoring

Parameter	Frequency	Location
<b>DISINFECTION BYPRODUCTS</b>		
TTHM & HAA5 Comm. and NTNC that disinfect	4 samples per quarter per treatment plant <sup>2</sup>	At least 25% of all samples collected each quarter at locations representing maximum residence time. The remaining samples are to be taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water, and different treatment methods.
Chlorite Comm. and NTNC that use chlorine dioxide for disinfection or oxidation.	Daily	Entrance to the distribution system
	Monthly - 3 sample set	One sample at each of the following locations: near the first customer, location representative of average residence time, and location reflecting maximum residence time
Bromate Comm. and NTNC that use ozone for disinfection or oxidation.	Monthly - 1 sample per treatment plant using ozone	Entrance to the distribution system while the ozonation system is operating under normal conditions
<b>DISINFECTION BYPRODUCT PRECURSORS</b>		
TOC and Alkalinity (paired samples) – Refer to <a href="#">latest revision of</a> Working Memo 818.		
<b>DISINFECTION RESIDUALS</b>		
Chlorine and Chloramines Comm and NTNC using chlorine or chloramines	Same time total coliforms are sampled	Same locations as total coliforms are sampled. NOTE: Separate locations may be approved for monitoring if the location is more representative of the treated water quality.
Chlorine Dioxide Comm., NTNC and TNC that use chlorine dioxide for disinfection or oxidation.	Daily	Entrance to the distribution system

<sup>2</sup> For water systems served by more than one treatment plant ([this includes purchased water](#)) a set of 4 samples per quarter must be collected in the distribution system area served by that individual plant. Therefore, one water system may have two or more subsets of TTHM & HAA5 monitoring results.

Additional Monitoring

Parameter	Trigger	Frequency	Location
<b>DISINFECTION BYPRODUCTS</b>			
TTHM & HAA5	NA	NA	NA
Chlorite	Daily routine result that exceeds the PMCL	3 samples each day following an exceedance	As close to the first customer as possible A location representative of average residence time As close to the end of the distribution system as possible (reflecting maximum residence time.)
Bromate	NA	NA	NA
<b>DISINFECTION BYPRODUCT PRECURSORS</b>			
TOC and Alkalinity (paired samples)	NA	NA	NA
<b>DISINFECTION RESIDUALS</b>			
Chlorine and Chloramines	NA	NA	NA
Chlorine Dioxide	Daily routine result that exceeds the MRDL	3 samples each day following an exceedance	If chlorine dioxide, chloramines or chlorine is used to maintain a disinfectant residual in the distribution system without booster chlorination, the samples must be collected: As close to the first customer as possible at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system with booster chlorination, the samples must be collected at the following locations: As close to the first customer as possible A location representative of average residence time As close to the end of the distribution system as possible (reflecting maximum residence time.)

## Reduced Monitoring

Parameter	Trigger	Frequency	Location	Resume Routine Monitoring
<b>DISINFECTION BYPRODUCTS</b>				
TTHM & HAA5	TOC source water (before any treatment) annual average is less than or equal to 4.0 mg/l and monitored one year with a TTHM annual average less than or equal to 0.040 mg/l and the HAA5 annual average is less than or equal to 0.030 mg/L	One sample per treatment plant per quarter	Distribution system location reflecting maximum residence time.	When the average of all samples taken in the year is greater than 0.060 mg/l for TTHMs or 0.045 mg/l for HAA5s. Must resume routine monitoring in the quarter immediately following the monitoring period in which the system exceeds the above levels.
Chlorite	NA	NA	NA	NA
Bromate	Source water bromide concentration is less than 0.05 mg/l based upon representative monthly bromide measurements for one year	One sample per quarter	Entrance to the distribution system while the ozonation system is operating under normal conditions	When the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/l based upon representative monthly measurements.
<b>DISINFECTION PRODUCT PRECURSORS</b>				
TOC and source water Alkalinity (paired samples)	Average treated water TOC is less than 2.0 mg/l for two consecutive years; or, less than 1.0 mg/l for one year	One paired sample per treatment plant per quarter	One source water and one treated water	The month following the quarter when the annual average treated water TOC is greater than or equal to 2.0 mg/l
<b>DISINFECTION RESIDUALS</b>				
Chlorine and Chloramines	NA	NA	NA	NA
Chlorine Dioxide	NA	NA	NA	NA

## COMPLIANCE REQUIREMENTS

The Disinfectants and Disinfection Byproducts Rule establishes the following Primary Maximum Contaminant Levels (PMCLs), and Maximum Residual Disinfectant Levels (MRDLs).

DISINFECTION BYPRODUCT	PMCL (mg/l)
Total Trihalomethanes	0.080
Haloacetic acids (five)	0.060
Bromate	0.010
Chlorite	1.0
DISINFECTANT RESIDUAL	MRDL (mg/l)
Chlorine	4.0 (as Cl <sub>2</sub> )
Chloramines	4.0 (as Cl <sub>2</sub> )
Chlorine dioxide	0.8 (as ClO <sub>2</sub> )

### 1. MONITORING VIOLATIONS

When compliance is based on a running annual average of monthly or quarterly samples or averages for:

TTHM, HAA5 or Bromate:

and the system fails to monitor during any month or quarter, the failure to monitor violation will be for the entire period covered by the annual average.

Chlorine and Chloramines:

and the system's failure to monitor makes it impossible to determine compliance with MRDLs, the failure to monitor violation will be for the entire period covered by the annual average.

### 2. COMPLIANCE DETERMINATION

All compliance samples taken and analyzed in accordance with the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required. A compliance sample is defined as any sample listed in the monitoring plan.

During the first year of monitoring, if any individual quarter's average will cause the running annual average of that system to exceed the PMCL, the system is in violation at the end of that quarter.

DISINFECTION BYPRODUCTS	
TTHMs and HAA5s	<p>Compliance is based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.</p> <p>If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the PMCL, the system is in violation.</p> <p>If a system fails to complete four consecutive quarters' monitoring, compliance with the PMCL for the last four-quarter compliance period must be based on an average of the available data.</p> <p>Systems on a reduced monitoring schedule whose annual average exceeds the PMCL will revert to routine monitoring immediately. Compliance with the PMCL will not be determined until they have completed one year of routine monitoring.</p>
Bromate	<p>Compliance is based on a running annual arithmetic average, computed quarterly, of monthly samples (or for months in which the system takes more than one sample, the average of all samples collected during the month).</p> <p>If the average of samples covering any consecutive four-quarter period exceeds the PMCL, the system is in violation.</p> <p>If a system fails to complete 12 consecutive months' monitoring, compliance with the PMCL for the last four-quarter compliance period must be based on an average of the available data.</p>
Chlorite	<p>Compliance is based on an arithmetic average of each three-sample set taken in the distribution system.</p> <p>If the arithmetic average of any three-sample set exceeds the PMCL, the system is in violation of the PMCL.</p>
DISINFECTANT RESIDUALS	
Chlorine and Chloramines	<p>Compliance is based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected.</p> <p>If the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation.</p> <p>When a system switches between the use of chlorine and chloramines for residual disinfection during the year, compliance calculation is determined by including together all monitoring results of both chlorine and chloramines. The monthly report must clearly indicate which residual disinfectant was analyzed for each sample.</p>
Chlorine Dioxide	<p><u>Acute Violations:</u> Compliance is based on consecutive daily samples.</p> <p>If any daily sample taken at the entry point exceeds the MRDL and on the following day one or more of the three samples taken in the distribution system exceed the MRDL, the system is in violation. The system must take immediate corrective action to lower the level of chlorine dioxide below the MRDL.</p> <p>Failure to take samples in the distribution system the day following an exceedance at the entry point is also considered an acute MRDL violation.</p> <p><u>Nonacute Violations:</u> Compliance is based on consecutive daily samples.</p> <p>If any two consecutive daily samples taken at the entry point exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation. The system must take corrective action to lower the level of chlorine dioxide below the MRDL at the entry point.</p> <p>Failure to take samples at the entry point the day following an exceedance of the MRDL at the entry point is also a nonacute MRDL violation.</p>

NOTE: Public notification is required for each of the above violations.

## DISINFECTION BYPRODUCT PRECUSORS (TOC)

Systems must operate with enhanced coagulation or enhanced softening to achieve the TOC percent reduction between the source water and the combined filter effluent as listed below unless the State approves a system's request for alternate minimum TOC removal (Step 2):

### STEP 1 – Required Removal of TOC by Enhanced Coagulation and Enhanced Softening

Source Water TOC mg/l	Source Water Alkalinity, mg/l as CaCO <sub>3</sub>		
	0-60	>60-120	>120
>2.0 – 4.0	35.0%	25.0%	15.0%
>4.0 – 8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%

#### NOTES:

1. Systems meeting at least one of the conditions under the alternative compliance criteria for enhanced coagulation and enhanced softening systems are not required to operate with enhanced coagulation.
2. Softening systems meeting one of the additional alternative compliance criteria are not required to operate with enhanced softening.
3. Systems practicing softening are required to meet the TOC reduction in the source water alkalinity column >120 mg/l.

Systems that are not able to achieve the Step 1 TOC removals due to water quality parameters or operational constraints may apply to the State within three months of failure for approval of alternative minimum TOC (Step 2) removal requirements specific for their system. If the state approves the alternative minimum TOC removal (Step 2) requirements, the state may make those requirements retroactive for the purposes of determining compliance. Until the State approves the Step 2 TOC removal requirements, waterworks must meet the Step 1 TOC removals contained in the above table.

#### Compliance Calculations for TOC Removal

Systems must calculate compliance quarterly, beginning 12 months after the system has collected data, by determining an annual average using the following method:

- #1. Determine actual monthly TOC percent removal  
$$[1 - (\text{treated water TOC} / \text{source water TOC})] \times 100$$
- #2. Determine the required monthly TOC% removal from either Step 1 or Step 2
- #3. Divide the actual monthly TOC% removal by the required monthly TOC% removal to determine ratio.
- #4. Average the last 12 months of ratios from item #3 above.
- #5. If the value calculated in item #4 above is less than 1, the system is **not** in compliance with the TOC% removal requirements.

#### Special cases:

Multiple paired samples per month without alternative compliance criteria:

Determine the percent removal for each paired sample as described in #1 above and average the percentages. Determine the required percent removals based on the each of the raw water TOC and alkalinity as described in #2 above and average these percentages. Using these averages complete #3-#5 above.

Multiple paired samples per month with alternative compliance criteria:

Follow the steps in #1 - #3 for each sample. If any of the samples results meet an alternative compliance criteria (see next page) then enter 1.0 for the ratio. Average the ratios for the month and use these values to complete #4-#5 above.

One raw water TOC with multiple treated water TOC samples:



Determine the ~~percent removals for the raw water TOC and each treated water TOC sample as described in #1 above and average the percentages~~flow-weighted average of the treated water TOC. Using this average complete ~~#2-#5~~#1-#5 above.

Systems may assign a monthly value of 1.0 in lieu of the value calculated in item #3 above if in any month the:

- system's treated or source water TOC level is less than 2.0 mg/l
- system practicing softening removes at least 10 mg/l of magnesium hardness (as  $\text{CaCO}_3$ )
- system's source water SUVA, prior to any treatment is  $\leq 2.0$  L/mg-m
- system's finished water SUVA, is  $\leq 2.0$  L/mg-m
- system practicing enhanced softening lowers alkalinity below 60 mg/l (as  $\text{CaCO}_3$ )

#### Alternative Compliance Criteria for TOC Removal

In lieu of the above compliance calculations, systems may use the following alternative compliance criteria. NOTE: Systems must still comply with monitoring requirements.

- Source water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.
- Treated water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.
- Source water TOC level is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity is greater than 60 mg/L (as  $\text{CaCO}_3$ ), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance, the waterworks has made a clear and irrevocable financial commitment not later than the effective date for compliance to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Waterworks must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the state for approval not later than the effective date for compliance. These technologies must be installed and operating no later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.
- TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.
- Source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
- Finished water SUVA, measured monthly, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

#### Additional Alternative Compliance Criteria for Softening Systems – TOC Removal

In lieu of the above compliance calculations, systems practicing enhanced softening that cannot achieve the Step 1 TOC percent removals may use the following alternative compliance criteria. NOTE: Systems must still comply with monitoring requirements.

- Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as  $\text{CaCO}_3$ ), measured monthly and calculated quarterly as a running annual average.

- Softening that results in removing at least 10 mg/l of magnesium hardness (as  $\text{CaCO}_3$ ) measured monthly and calculated quarterly as a running annual average.

## REPORTING AND RECORDKEEPING REQUIREMENTS

Parameter	Must Report
<b>DISINFECTION BYPRODUCTS</b>	
TTHM and HAA5	<ol style="list-style-type: none"> <li>1. The number of samples taken during the last quarter.</li> <li>2. The location, date and result of each sample taken during the last quarter.</li> <li>3. The arithmetic average of all samples taken in the last quarter.</li> <li>4. The annual arithmetic average of the quarterly arithmetic averages for the last four quarters.</li> <li>5. Whether the PMCL was exceeded.</li> </ol>
Chlorite	<ol style="list-style-type: none"> <li>1. The number of entry point samples taken each month for the last 3 months.</li> <li>2. The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter.</li> <li>3. For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the distribution system.</li> <li>4. Whether the PMCL was violated, in which month, and how many times it was violated each month.</li> </ol>
Bromate	<ol style="list-style-type: none"> <li>1. The number of samples taken during the last quarter.</li> <li>2. The location, date and result of each sample taken during the last quarter.</li> <li>3. The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.</li> <li>4. Whether the PMCL was violated.</li> </ol>
<b>DISINFECTANT RESIDUALS</b>	
Chlorine or Chloramines	<ol style="list-style-type: none"> <li>1. The number of samples taken during each month of the last quarter.</li> <li>2. The monthly arithmetic average of all samples taken in each month for the last 12 months.</li> <li>3. The arithmetic average of all monthly averages for the last 12 months.</li> <li>4. Whether the MRDL was violated.</li> </ol>
Chlorine Dioxide	<ol style="list-style-type: none"> <li>1. The dates, results and locations of samples taken during the last quarter.</li> <li>2. Whether the MRDL was violated.</li> <li>3. Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.</li> </ol>

Parameter	Must Report
<b>DISINFECTION BYPRODUCTS PRECURSORS</b>	
Waterworks monitoring monthly or quarterly for TOC and required to meet the enhanced coagulation or enhanced softening requirements.	<ol style="list-style-type: none"> <li>1. The number of paired (source water and treated water) samples taken during the last quarter.</li> <li>2. The location, date and results of each paired sample and associated alkalinity taken during the last quarter.</li> <li>3. For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal.</li> <li>4. Calculations for determining compliance with the TOC percent removal requirements.</li> <li>5. Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements for the last four quarters.</li> </ol>
Waterworks monitoring monthly or quarterly for TOC and meeting one or more of the alternative compliance criteria. See Working Memorandum 818 for listing of the alternative compliance criteria.	<ol style="list-style-type: none"> <li>1. The alternative compliance criterion that the system is using.</li> <li>2. The number of paired samples taken during the last quarter.</li> <li>3. The location, date and result of each paired sample and associated alkalinity taken during the last quarter.</li> <li>4. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC or of treated water TOC</li> <li>5. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA or of treated water SUVA.</li> <li>6. The running annual average of source water alkalinity and of treated water alkalinity.</li> <li>7. The running annual average for both TTHM and HAA5.</li> <li>8. The running annual average of the amount of magnesium hardness removal (as CaCO<sub>3</sub>, in mg/L).</li> <li>9. Whether the system is in compliance with the particular alternative compliance criterion.</li> </ol>

## MANDATORY HEALTH EFFECTS LANGUAGE

The D/DBPR set the following mandatory health effect language for public notices:

(76) Chlorine. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chlorine is a health concern at certain levels of exposure. Chlorine is added to drinking water as a disinfectant to kill bacteria and other disease-causing microorganisms and is also added to provide continuous disinfection throughout the distribution system. Disinfection is required for surface water systems. However, at high doses for extended periods of time, chlorine has been shown to affect blood and the liver in laboratory animals. EPA has set a drinking water standard for chlorine to protect against the risk of these adverse effects. Drinking water, which meets this EPA standard is associated with little to none of this risk and should be considered safe with respect to chlorine.

(77) Chloramines. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chloramines are a health concern at certain levels of exposure. Chloramines are added to drinking water as a disinfectant to kill bacteria and other disease-causing microorganisms and are also added to provide continuous disinfection throughout the distribution system. Disinfection is required for surface water systems. However, at high doses for extended periods of time, chloramines have been shown to affect blood and the liver in laboratory animals. EPA has set a drinking water standard for chloramines to protect against the risk of these adverse effects. Drinking water, which meets this EPA standard is associated with little to none of this risk and should be considered safe with respect to chloramines.

(78) Chlorine dioxide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chlorine dioxide is a health concern at certain levels of exposure. Chlorine dioxide is used in water treatment to kill bacteria and other disease-causing microorganisms and can be used to control tastes and odors. Disinfection is required for surface water systems. However, at high doses, chlorine dioxide-treated drinking water has been shown to affect blood in laboratory animals. Also, high levels of chlorine dioxide given to laboratory animals in drinking water have been shown to cause neurological effects on the developing nervous system. These neurodevelopmental effects may occur as a result of a short-term excessive chlorine dioxide exposure. To protect against such potentially harmful exposures, EPA requires chlorine dioxide monitoring at the treatment plant, where disinfection occurs, and at representative points in the distribution system serving water users. EPA has set a drinking water standard for chlorine dioxide to protect against the risk of these adverse effects.

Note: In addition to the language in this introductory text of paragraph (78), systems must include either the language in paragraph (78)(i) or (78)(ii) of this section. Systems with a violation at the treatment plant, but not in the distribution system, are required to use the language in paragraph (78)(i) of this section and treat the violation as a nonacute violation. Systems with a violation in the distribution system are required to use the language in paragraph (78)(ii) of this section and treat the violation as an acute violation.

(78)(i) The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, and do not include violations within the distribution system serving users of this water supply. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to present consumers.

(78)(ii) The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system serving water users. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including pregnant women, infants, and young children, may be especially susceptible to adverse effects of excessive exposure to chlorine dioxide-treated water. The purpose of this notice is to advise that such persons should consider reducing their risk of adverse effects from these chlorine dioxide violations by seeking alternate sources of water for human consumption until such exceedances are rectified. Local and State health authorities are the best sources for information

concerning alternate drinking water.

(79) Disinfection byproducts and treatment technique for DBPs. The United States Environmental Protection Agency (EPA) sets drinking water standards and requires the disinfection of drinking water. However, when used in the treatment of drinking water, disinfectants react with naturally-occurring organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA has determined that a number of DBPs are a health concern at certain levels of exposure. Certain DBPs, including some trihalomethanes (THMs) and some haloacetic acids (HAAs), have been shown to cause cancer in laboratory animals. Other DBPs have been shown to affect the liver and the nervous system, and cause reproductive or developmental effects in laboratory animals. Exposure to certain DBPs may produce similar effects in people. EPA has set standards to limit exposure to THMs, HAAs, and other DBPs.

(80) Bromate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that bromate is a health concern at certain levels of exposure. Bromate is formed as a byproduct of ozone disinfection of drinking water. Ozone reacts with naturally occurring bromide in the water to form bromate. Bromate has been shown to produce cancer in rats. EPA has set a drinking water standard to limit exposure to bromate.

(81) Chlorite. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chlorite is a health concern at certain levels of exposure. Chlorite is formed from the breakdown of chlorine dioxide, a drinking water disinfectant. Chlorite in drinking water has been shown to affect blood and the developing nervous system. EPA has set a drinking water standard for chlorite to protect against these effects. Drinking water, which meets this standard is associated with little to none of these risks and should be considered safe with respect to chlorite.

Monitoring Plan

Waterworks: \_\_\_\_\_ PWSID No.: \_\_\_\_\_ County: \_\_\_\_\_

<u>Location Code</u>	<u>Location</u> If a street address attach a map of the distribution system showing the locations If within the treatment plant attach a sketch of the treatment process.	<u>Parameter</u> (Bacteriological/Disinfection Residual, chlorine dioxide, TTHM/HAA5, chlorite, bromate, bromide, TOC/Alkalinity)	<u>Data will be interpreted by DWSE or Waterworks (if Waterworks then explain procedure on separate sheet)</u>	<u>Schedule including Dates and Type of Monitoring</u>		
				<u>Routine</u>	<u>Additional</u>	<u>Reduced</u>

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_